#### Unexamined Patent Application Bulletin

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	Patent Application
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1. Title of the Invention:	Air sterilization and purification apparatus
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5. List of Appended Documents

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(4) Power of Attorney 1 set Method Examination

(5) Request for Examination 1 set

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#### Specification-

1. Name of the Invention: Air Sterilization and Purification Apparatus

#### 2. Scope of Patent Claims

In an air purification apparatus that passes positively charged airborne dust between opposing electrodes, an air sterilization and purification apparatus wherein air is caused to pass through while inducing a separation phenomenon by switching the direction of flow of air that passes through the aforementioned opposing electrodes and modifying a cross section of the passage.

#### 3. Detailed Description of the Invention

The invention of the present application is one that relates to an air sterilization and purification apparatus, and in a purification device that causes airborne dust particles to be absorbed by static electricity, relates to a device capable of raising dust removal effectiveness, and is intended to achieve an air sterilization and purification apparatus that, in particular, is made up of a combination of novel and ever simpler elements, is manufactured by a simple process with lower costs of production, and that, with excellent safety, is capable of achieving even better results in use.

Along with the development of heavy industry, air pollution from sources at each stage of the production process, nitrous oxide and sulfur dioxide emitted from transportation sources, and heavy metal particulates, have steadily increased. The widespread expansion of pollution has become an issue of serious concern to society, and various regulations have been proposed to prevent pollution, including preventing the generation of toxic materials as well as the strengthening of emissions standards. These approaches, however, cannot be considered adequate, and there are a growing number of people who suffer from lung cancer and other cancers as well as an increase in the number of people suffering from asthma. Air purifiers have become a common and indispensable part of life and are to be found installed in homes and sickrooms to prevent and/or treat these illnesses, and are used as prevention or treatment devices in the production stages of sanitary pharmaceuticals, foods, devices, and are also employed in the production of precision machinery.

A variety of devices have been suggested to cleanse the air by removing airborne toxic materials. Among those are air purifiers that use filter materials in air flow passageways to physically collect the dust, or electrical air purification devices such as dust removers that make use of static electricity or infrared rays to disinfect the air, or a combination of any of these approaches in order to remove toxic materials.

Among these, suggestions for conventional devices based on the aforementioned use of static electricity are known, including, for example, (a) an approach utilizing centrifugal force designed such that air, induced from an air inlet, passes through an ionization element while electrical voltage is applied to the inner and outer cylinders while the inner cylinder rotates, moving the air between the inner and outer cylinders, and (b) an approach where, in the above configuration, the outer circumference of an inner cylinder has inclined guide vanes provided in the axial direction along the outer circumference of the inner cylinder and rotational movement is applied to the air as it passes through between the inner and outer cylinders to make use of centrifugal force.

The above mentioned approaches have attempted combined dust collection by the use of electrostatic migration and centrifugal force, however, because high voltages with 11 KV in between the inner and outer cylinders, and as a result of rotating the induced air, a rectified electricity may be generated due to frictional resistance depending upon the air flow rate, and electric discharge sparks may occur between the dust particles that have collected onto the external cylinder, frequently causing risk of electrocution as well as the increased production of ozone and possible malfunction of the device.

In view of the above, research conducted by the inventors of the present application have overcome and eliminated the well known defects described above, and have perfected a device that is superior in terms of safety and that markedly increases the efficiency with which dust is adsorbed. The invention comprises a fan motor; an inner cylindrical electrode that has a

built-in high-voltage transformer, and that is connected to the positive side; a high voltage cap connected to the negative side; an external cylindrical electrode that is earthed; and a housing that has openings on both sides, and that is supported by a pedestal. On occasion that airborne dust that is guided into the unit through the upper inlet passes through an ionization section high-voltage cap that is connected on the negative side, a positive charge is applied to the dust, and it is guided into the electrostatic field between the grounded outer cylindrical electrode and the positive inner cylindrical electrode, and as a result of the electrostatic induction effect, airborne dust passing through is adsorbed onto the surface of the outer cylindrical electrode. Thus, the present invention is characterized by having opposing electrodes that have a plurality of parallel curved surfaces and a plurality of convex curved surfaces or recessed curved surfaces on the inner cylinder and an outer cylinder provided with a plurality of parallel curved surfaces and a plurality of convex curved surfaces or recessed surfaces, wherein the convex curved surfaces or recessed surfaces of the inner cylinder and the convex surfaces or recessed surfaces of the outer cylinder alternate with each other. By creating an electrostatic field between these opposing cylinders, the direction of the flow of air passing through them can be alternated, and the flow passageway cross section can be altered so that the flow rate fluctuates, thereby creating a flow separation phenomenon. This causes the generation of a stagnant flow, a reverse flow, or a turbulent flow of air that contains dust. The intention here is to extend the duration of the effect of the electrostatic adsorption on the outer cylindrical electrode surface and to increase in the efficiency of dust removal. The next object of this invention is to provide a device with superior safety. Additionally, an object of the invention is to provide a simple and compact mechanism that can be made available at low cost and that can be placed easily in a variety of locations, as well as to provide a device that allows simple, easy, and safe cleaning of the panel upon which the dust has been adsorbed. Other objects and characteristics of the present invention can be understood. from the following explanation.

In Figs. 1 through 5, a housing acceptor cylinder (5) is supported on a stand (1) by means of a shaft (2) upon which a support board (4) consisting of insulating material and provided with exhaust windows (3); an external cylinder accepting cylinder (7) is mounted on the edge of the lower opening section of said housing; an exhaust windows (6') is arranged in the external cylinder barrel (7); and a fan motor (8) is internally installed in a motor cap (9). The fan motor (8) (for practical purposes, preferably with a maximum torque of  $1040 \pm 10\%$ ) is connected to a power source, and the motor cap (9) has a built-in high-voltage transformer (11) that is connected to a power source. An inner tube electrode (14) made of metal and provided with stepwise alternating vertical curved surfaces (12) and convex curved surfaces (13) is installed onto the positive side of the high-voltage transformer, and a rounded-head inner cap (16) made of insulating material and continuing the multiple outer cylinder support [illegible] (15), (15) is mounted in the top opening of this inner cylindrical electrode (14). A metallic high voltage cap (18) that is provided with a limit switch (17) is installed in this cap (16) and connected to the negative side of the high-voltage transformer and a metallic outer cylindrical electrode (22) provided with stepwise alternating vertical curved surfaces (20) and recessed curved surfaces (21) on the upper opening edge step section (19) of the outer cylinder acceptor (7). The vertical arced surfaces (20) and the recessed arced surfaces (21) are positioned so as to face the swelling arced surfaces (12) on the inner cylindrical electrode (14) and the vertical arced surfaces (12) on the inner cylindrical electrode (14) with each other, respectively. The external cylindrical electrode (22) faces the inner cylindrical electrode (14). According to FIG. 1, an air inlet window (23) is arranged in the upper opening of the external cylindrical electrode (22), and a retainer plate (25) made of insulating material is provided on the bottom limit switch retainer element (24). Next.

the housing (27) is installed on the upper opening of the outer perimeter section (26) of the housing acceptor cylinder (5), which is installed on the support board (4). A head section retaining cylinder (28) is installed at the top section of this opening, and an air inlet window (29) is provided in this upper opening and a connector board (31) made of insulating material and provided with dust-proof mesh/screen (30) that is connected by means of bolts (32) to the retainer plate (25), air inlet windows (29), and air inlet windows (23), and is configured so that air passes between the inner and outer electrodes, the exhaust windows (6), and the exhaust windows (3), and is circulated to the outside when the fan motor (8) is operating.

At this time, when the high voltage transformer (11) and power source are connected by a switch, which is separately arranged (in practical terms, an input voltage of 100 V AC and output voltage of 7 KV DC are preferable) the airborne dust that is introduced [into the unit] is positively charged in the vicinity of the transformer (11), by the inner cylindrical electrode (14) that has been connected to the positive side by means of the electrostatic induction between the inner and outer electrodes, and is migrated to the external cylindrical electrodes (22) and clung to its walls.

Here, the direction of the air flow that is passing through the convex curved surfaces (12) and vertical curved surfaces (13) provided on the inner cylindrical electrode (14) is switched by the vertical curved surfaces (20) and recessed curved surfaces (21) provided on the outer cylindrical electrodes (22), and as a result of the change in the cross section layer between these electrodes, the spacing between the vertical curved surfaces (12), (20) of both electrodes should be approximately 20 mm; the spacing between the vertical curved surfaces (21) on the outer cylindrical electrodes (22) and the convex surfaces (13) on the inner cylindrical electrodes (14) should be approximately 16 mm; and the spacing between the recessed curved surfaces (21) on the outer cylindrical electrodes (22) and the vertical curved surfaces (12) on the inner cylindrical electrode (14) should be approximately 25 mm, for practical purposes. The recessed curved surfaces (21) should be 5 mm in diameter, while the convex curved surfaces (13) should be 4 mm in diameter. There is a change in flow rate, and the separation phenomenon is augmented. As a result, the dust-bearing air flow stagnates, reverses or becomes turbulent, thereby extending the duration for electrostatic adsorption and increasing dust collection efficiency (Fig. 6).

In the cross sectional configuration of the above mentioned both electrodes described above, in another embodiment, the convex curved surfaces (13) of the inner cylindrical electrodes (14) could have a gentle linear flow [illegible] convex curved surfaces (13) on the upstream side to intensify the switching of the direction of flow and the change in the flow passageway cross section, making it that much easier for the separation phenomenon to occur, forming lead (33) between the convex curved surfaces (13), (13) for a configuration that augments electrostatic induction. (Fig. 7)

Moreover, as a separate embodiment, convex curved surfaces (34) with gentle flow lines are formed on the upstream side of the outer cylindrical electrodes (22), and both flow line convex curved surfaces (34) and flow line convex curved surfaces (35) are positioned so they oppose one another, thereby intensifying the switching of the direction of flow and the change in the flow passageway cross section, extending the duration in which adsorption occurs due to stagnation, reverse flow, and turbulent flow of the dust-containing air (Fig. 8).

With regard to removal of dust clung onto the surfaces of the outer cylindrical electrodes, the power to electrode (22) is removed along with the retainer plate (25) by removing the connector board (31) and by pulling up and removing the head section retaining cylinder (28) and the housing (27), and after cleaning these, it is easy to restore them to their original state and join together. At this time, the retainer element (24) of the retainer plate (25) is separated from the limit switch

(17), thereby breaking off the flow of current between the high-voltage transformer (11) and the power source, so that there is no risk of electrocution.

As configured above, the present invention extends the duration of the cling effect on the outer cylindrical electrode by means of electrostatic induction of the dust-carrying air that passes between the electrodes, thereby increasing the efficiency of dust removal and reducing mold spores and yeast fungus.

Moreover, this is a particularly safe device since there is no danger that frictional force and resulting rectified electricity will be generated as a result of centrifugal force as the air passes through the unit, and the risk of malfunction due to sparking electric discharge between the adsorbed dust particles resulting in electrocution or explosion can be prevented, and the generation of ozone can be suppressed.

Also, given the device's simple and compact configuration, it can be manufactured less expensively, and it is also easy to move.

#### 4. Brief Description of the Drawings

Figure 1 is a front view. Figure 2 is a plan view. Figure 3 is a view of the bottom surface. Figure 4 is a cross-sectional view along the A-A line in Figure 1. Figure 5 is a cross-sectional view along the B-B line in Figure 6 is an enlarged view of the area indicated by the letter E in Figure 4. Figure 7 is an enlarged flow line cross section diagram of another embodiment. Figure 8 is an enlarged flow line cross section diagram of yet another embodiment.

Applicant: Kyowa Seiko, Ltd. Agent: Hiraki MIURA [seal]

竹 許 顧

帮中厅是官 4 4 X A 股

1. 英男の名称 医元复置型部身近

在 14 Hane 去线系统第 20 4 60 5

(1) 男親子(1) 関 新

1111



50 e16060

3、有明日也称 空仪数据设计定位 3、包括超浓的组织

高ので存むな人もれた恋なのの人人で人々。 対 対する状態を出場をせるようだした空気を予生 気にかいて、上色対向するで変調を通過するが気 の内もがはま似れてせ、水の食物の場面が生態や なせることによって、対象の食を対ちでながり空 体を答応せいるようにしたととも呼吸とする交 気を満足せいる。

2、有效口,处理必然和

一定期の長男は、空気状態情を異式状態し、果実甲のふんじんを覚覚気により異常せしめる情か成 優にかいて、その物理が必要があととのできる 松橋长押し、かく心の説で一層単純を発がのかか からなり、海平を生物とより他の位置をではで生 様々丸。 本少女心性に何れ、よりない化片が異を 等るどとのできる役別的質情が異せを持んとする ものである。

我可谓工度有两只代码6、有效企业企业。

(8) 日本国特别疗

# 公開特許公報

四代開昭 51-9007年 日公開日 昭51 (1976) 8. 6 田谷前昭 チローノルトロ 田出顧日 昭10. (1975) ユール 東左請求 有 (全5) ア内整理番号 フパナチノ

包日本分類 アユ CFY

DIALCIA BOSC S/QP

て切りかれる大大ス行矢がいまび情が現状によって 可知かれる又本政党を表現の現实はまって民党を 大の大力のの現代をでは、いの成立と、大政党を し、大力のしての成所である。 で大力のしての成所である。 で大力のしての成所である。 で大力のしての成所である。 で大力のでは、大政党がある。 で大力のでは、大政党がある。 では、ののなど、大政党がある。 では、ののでは、大政党のの大政党を ののようなが、大政党のの大政党の では、ののでは、大政党の ののでは、、ののでは、、ののでは、 ののでは、、ののでは、、ののでは、 ののでは、、ののでは、、ののでは、 ののでは、、ののでは、 ののでは、、ののでは、 ののでは、 のので、 ののでは、

そとで、エステの容可能質を防力して対象化の ための現実が関々提供され、そのいくつがは空気 の選末体にかいて何とは、提高が可を用いけまり に提成するくのかとび計せば対象により収定を成 せしからくの又はまだがを買い取りが成を削する や似れ的に付かまするの最上の合となるけれる。 かせが合によつて有害物質を取扱せんとする技術 おそぜれている。

本田の気軽は、皆様気の表別方と流の力とのを 成就に作用を使つたものであるが、流会門外所は 例に11天下の声は取を印むし、が入他のを使用 をその対象、生気の成果によつでは所作が次にこ つでを成実なも生じ、外別に表別された上心じん もの例に大利女母を企じ、しばしば何でのかそん があり、スナソンの背近女をガスレイソン具を及 め前政上がしくまる。又しばしば女母を生かる当 の大人であれるよったので内市化が田田でもつた

於して、河は世河河河中大路世界是東京上上上 にして、河河ナ系男がの形式力内のの石門か上上が の形式がの男が成立を大陸の一般に の野野町がの元に、 の一般に、 の一般に、 は、 ののに、 は、 ののに、 は、 は、 ののに、 は、 は、 ののに、 は、 は、 ののに、 

女女はの世代かいて、女母のにより他のたかして実本でれる共気は付を共える助政人があられる 実法を役に、ステクング元世の女女とし、成ハウ ## #351--98 # 7 P

上四尺女子。三河众外关づ以外又の伊州上纪念 知力與特化工态欠点を思维的激制、古名化自由水 氏長れ、ふんとんら異な特帯を一ゼズやるととの でもるのはも思慮したもので、ファンセートル、 不 把トランスで打撃してひがたかめした円分せる **丸の気にがおした双筋キャッツ、所もしたが**食 可证如土田所州长州日朝七多万分从汉人名森北人。 タヤングから者成され、上海入日本を得入される 在第一个人心心力。 点力 被称的现在形式 医牙 イツアの食品がも見過する際。その世界を与えら 八、蔡胤等先大师首家最长超白祖纪刘朝守れ九月 超过最级的影響原於祖本北。 乔年斯堡成果长上口 ておえているなってかいのかがまればいる。 せしめる最低を兵士をもので、したべつで決ち労 の羽衣だよう。双方士志宣《故,积成心不行或谓 との州の河南県田大田田南東南を北北る西海と、 D·全区数据《平疗效器 b.故报》的条款的"民政路胜 祖祖祖北东州州太安。七〇约翰〇审四武石又收四 海轨城之。外界の四极贫瘠又住庭组织而之条灰定。

クンノ穴河内の下河道の出血脈に、 対気を (で) と 在对北美四亚田宇宙空心大外间只到四天代也。そ の上方年にファンモートル前を月刊した希望大人 からでスタートルデヤップ付きをすしい アブレヤ っちゃ付き 天材的に依然大きがブンタモラ 去まか ・ゴボススしい」を本質に無味するととかよび、は ペートルイベックは小佐河が村には近にかけ しか 実際チッドス (13) を打写し、異似に無質疾患 (3A) と早日共享 (DB) 七七民自由长元年代末七元 (DB) 可接可収 (34) を共配トランスの高の点の中央して とし双翼の外科文上第 CDL CDA を長度し大魚魚魚 発力:5 でふけぎキャップ 〇代を選挙して、 放子:ナ マス iso ドリミスト へんスァ (37) セイダし大金属 ロ美元キャップ (M)をおせい。 写をトランスの名 の名にお母子ストをからび、 可発外株公司のA 双非自己或者,在自己的长、人名英格拉斯斯英语(10)。 支持者 献 # (101) と 主民日野民 夏至民 教 (7) 大 金 島 (0) 八分司司(40) も何はして、七〇番立其を(40) かけ 神滅症 (24)の解析所 (23) まやす (24) を発展 (24) を (24) 39**8**— 「知」は可は支減(21)の最近は皆(20)と巫いに即行するとうにな反かめして。乃が電板(21)と別角でせて要求した。そのとプロロ板に最気をおりを表え、下側にすりとフトスインナの罪え替針(21)を異常した。下側にすりとフトスインナの罪えが(21)を異常した。また間に支え違何に要がしたハナジングは可なのとよが自己がに無極度(20)を提供した。その上アが口部に無極度(20)を接げからなが、その上アが口部に無極度(20)を接げからなが、そのしてがしたが体を付からなる逆が度(21)と別を移し、ボールトの対を介しる、ファンユートル研究を記し、が恐る所ならしる、ファンユートル研究をから取り、天気は其他な(20) アン・プリンとで罪えな(20) と認めの取り、天気は其他な(20) アン・ガリンとで罪えな(20)の表現(20)のこの可(23)とき。 門、外間が質問を通為して作品(21)。 門の公司で作品に可以よるである。

その以、名ピトクンス (20) ( 表別的には、入力 を図え、0、100 Y、 解力を収ま、0、 Y X Y ・ が深て U W。 ) と同様とを消化数けたスイック とより治理すれば、昨天かれる翌年の本んじん

上記英味也の成實が外にかれて、何の強強的を して。付賣可取 (34) の場合共高 (35) の上級 のを成 歩を見可取 (34) をしまれる内のの場合とか。 程度可謂可の実をを放えし、対政を出て一層場合。 作するとともにすらに、放棄自其制度 (33,123) に 等級 (33) を経緯して無理需要を由来する標度とす。 常にともできる。(以下限)

可多於文、別の表演可として、於切る故(以) 化一点就可比如いて疑念を見る知用故語 (24) を成少。 即以或以於下戶門於如いて提示を說解以關於其其 (25) を改立、 而我就即因其謂 (24) を改立 化 (25) を改立 化 (25) を (25) を

変化、共和電視性に集団された本人によの数決 性性のでは、対面は内容 (OSI もまりはし、対解す 上質 (OSI シェビハッグング (OSI を引上げて成当 放 した上心がみ収 (OSI からくだれ (N を (OSI か)) を 使を持ちしたほご は次に会して自分するでとお言 (四) に成別されたの配置に無理される。 (四) に成別されたの配置に対してよるはにによる (四) に成別されたのは、(24) に戻れられたのはに (四) に成別されたの配置に対してよったののにお (四) に成別されたの配置に無理される。

七〇朝、月間繁荣 (M) 长秋廿大坂田屯平 (20) b 医复数蛋白的 化水 经保险 (1221) 化量分元 物質質 M (MO) と目前共同 (22) とだこって、歴史の当然ナ 及對於中央。中央自然大大大學與政府官の裁算及 两心场面带【突然灯轮改算场域心体反似器 tiple。 [20] 口筒板板 \$ 6 次,共同电枢 (2) 0 杂页区域 (22) 上月前世紀-[14] の項報報報。[121] 上の何風故事。 上 6 端。 外內 4 個 (m) 中口角 数河 (四) 左四 河 电电 CATの最低英麗 (IA)」との再属をおまる気とすると b、科学中国外共享 (201 张 a 汽车、单 图 英 (23) はくろうとするにとかはてしい。 プロポポによつ て長端洪炎首も、女化の異な製造を特長ナるの景 となる。とれだよので会成的気の反義のな中で、気 化汉以此前世界官员出立它外员可任何司 计军权证 作用時間の延長が現むられた風が置き場でしるる 可求是少年。(再《始)

わりて関系を与てるる。 との成分人式 (20) の方人 保守 (20) 水サイント (20) とながし、写在 トフンハ (20) 人式がとのなれてボンので、成本の。 アでれた公司ない。

本事の成年化、上記の根末だとるので、 万仗成 同せ最後する古典是成本管理的単化とつて外貨で 程度所取貨作等時間を展長するので、その取屈が 取責等がよつその何本が可、解係品がの数をそ初 することができる。

文。強進中の気気は、液心物を化えつて無が特 技による機能を見の発出のやそれはなく、よつで 共満 でれてよんじんとの間に大花皮を比透剤する 単位 担いては関係がの理なも単位に由止するとと ボマと、スイントの構造を検討することをできる 気を供送れた供配である。

\$ 6 医我们的现在分词 医阿拉克氏 () 医克克氏 ()

4、即河の何水丸は男

新工程住民间间、新工程校平高级。 \$ 5 8 战灰

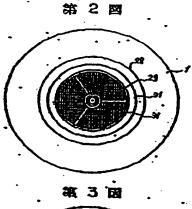
--399--

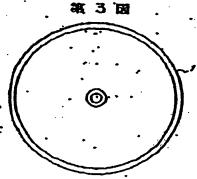
本市、成本的社会工作A--A 地区かけら成成を図 、スコ市以内の一点的にかけらの目的の、収点を 社群 6 2000年かける最大が明史公司、ポッツと在成形 実施例でかける内拡大所可見通道、ボのほ比す(D)の、 に対し、大阪のでありにかける再載大所再点設置である。

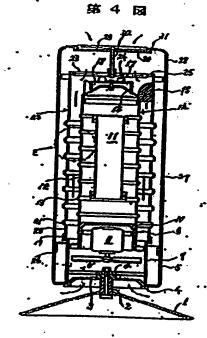
世間人 有限合体 祭 44 年 二



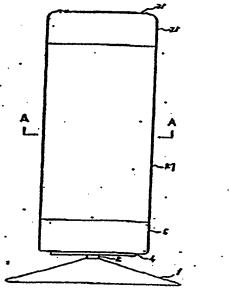
特用 昭S1-90077 (4). 選 | 図



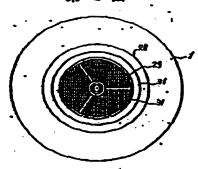




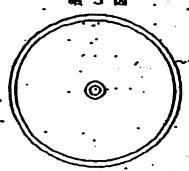
#用 R51—300 77 (g.

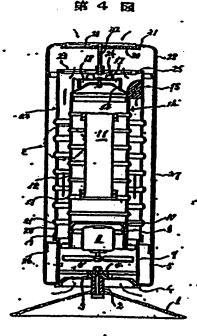


**第2** 函



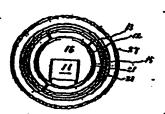
**86 2 36** 





松何 M51-90877 四

**孝 5 図** 



# 6 B # 7 B # 8 B

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